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10/539,618	06/17/2005	Bruno Clotteau	4590-424	2904

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EXAMINER	
PATEL, DHAVAL V	
ART UNIT	PAPER NUMBER
2611	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,618	CLOTTEAU, BRUNO	
	Examiner	Art Unit	
	DHAVAL PATEL	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *13-24 (1-12 cancelled)* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/9/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: ***(See MPEP Ch. 2141)***

a. Determining the scope and contents of the prior art;
b. Ascertaining the differences between the prior art and the claims in issue;
c. Resolving the level of ordinary skill in the pertinent art; and
d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

2. **Claims 13- 15, 17-20, 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cao et al. (US 7,346,122) (hereafter Cao) in view of Yang et al. (US 7,136,628)(hereafter Yang).**

Regarding claims 13 and 14, Cao discloses a loop for correcting at least one parameter to be corrected of a complex digital signal (Ser, d) comprising:

an input (Fig. 5, element 501) on which it receives the digital signal (set, d) (Fig. 5, Din),

a calculation system (Fig. 5, pre-distortion calculation, element 533) linked directly or indirectly to the input (Fig. 5, Din),

a correction device (Fig. 5, adaptive pre-distorter, element 505) deployed in a chain for processing the digital signal (Fig. 5, Din), and linked to the calculation system (Fig. 5, pre-distortion calibration, element 533) which provides at least one corrector (c) (Fig. 5, updating parameter of the pre-distorter) the calculation system (Fig. 5, pre-distortion calibration, element 533) comprising:

decomposing the signal into an envelope (er) signal and a phase (Per) signal (Fig. 5, demodulation, element 535),

However, Cao does not explicitly disclose decomposing the corrector c to be applied to each parameter to be corrected (Pc) of the envelope signal by searching, among predetermined values, for the value of the corrector corresponding to the minimum out-of-band noise power (N_h) of the output signal of a digital signal processing chain comprising a correction as a function of said corrector.

In the same field of endeavor, Yang teaches adaptive pre-distortion method to cancel any nonlinearity (abstract). Yang furthermore teaches the feedback signal sampling signals are processed digitally by the pre-distortion parameters adaptive controller, whereby out-of-band energy emission of the feedback signal is used as target function (col. 3 lines 19-26). Also, Yang teaches when a target function (out-of-band energy) takes minimum value; the values of the respective factors are taken as optimum values of the pre-distortion parameters (col. 3 lines 63-67), col. 6 lines 1-7 teaches selecting optimum point of distortion parameter where the target function (out-of-band energy to be the lowest).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention to incorporate such method of pre-distortion calibration as taught by Yang, in place of pre-distortion calibration as disclosed by Cao, so as to use out-of-band energy of feedback signal is used as a target function to optimize the pre-distortion parameters and not requiring the input signal, the motivations is to compensate for nonlinearity in transmission channel (col. 2 lines 50-57).

Regarding claim 15, Cao is silent about the correction loop as claimed in the wherein the input is the only input.

In the same field of endeavor, Yang teaches feed backing the signal to pre-distortion controller and use out-of-band energy as a target function to update the parameters without using any other input signal to the controller (Fig. 5, col. 5 lines 11-17).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention to use such teachings of Yang to use out-of-band energy as a function to update the parameters of pre-distorter instead of method as disclosed by Cao to input the signal to adaptive controller, the motivation is to compensate for any non-linearity without comparing input and output signal (col. 2 lines 50-57).

Regarding claim 17, Cao further discloses the correction loop (Fig. 5), wherein the parameters to be corrected (Pc) comprise an offset of the envelope signal with respect to the phase signal of the digital signal (col. 4 lines 29-31, timing mismatch) and

the correctors (c) comprise an inverse offset (Fig. 5, equalizer is inverse function to compensate for time offset).

Regarding claim 18, Both Cao and Yang furthermore discloses the correction loop (Cao, Fig. 5, comprises down converter, demodulation and pre-distortion calibration and Yang, Fig. 5, down converter, A/D and pre-distortion parameter adaptive controller), wherein the parameters to be corrected (Pc) comprise a nonlinearity (Yang, col. 3 lines 1-6) of the envelope signal, and the correctors (c) comprise a pre-correction (Yang, Fig. 5, pre-distortion parameter adaptive controller).

Regarding claim 19, Cao further discloses the correction loop (Fig. 5, correction loop comprises down-conversion, element 537, demodulation element 535 and pre-distortion calibration element 533), wherein the digital signal is a modulated digital (Fig. 5, modulator element 527) signal (SRF) (Fig. 5, feedback signal to element 537) and the loop comprises:

a demodulator (Fig. 5, demodulation, element 535) between the input (Fig. 5, feedback signal as input to down-conversion, element 537) and the calculation system (Fig. 5, pre-distortion calibration, element 533),

a correction device (Fig. 5, adaptive pre-distorter, element 505) intended to be deployed in a modulator (Fig. 5, modulator, element 527) with which the demodulator is associated (Fig. 5, demodulation element 535).

Regarding claim 20, Cao further discloses a transmitter (Fig. 5, transmitter, 580) comprising a modulator (Fig. 5, modulator, element 527) and the correction loop (Fig. 5, correction loop comprises down-conversion (537), demodulation (535) and pre-distortion calibration (533)) as claimed in the claim 19.

Regarding claim 22, Cao further discloses the transmitter (Fig. 5, 580), wherein the transmitter comprises separate means (Fig. 5, polar decomposition, element 503) of processing of the phase (Fig. 5, PM) and of the envelope of the modulated digital signal (Fig. 5, AM).

Regarding claim 23, Cao further discloses the transmitter, wherein the modulator comprises separate means (Fig. 5, polar decomposition) of processing of the envelope and of the phase (Fig. 5, phase and amplitude from polar decomposition) and a multiplier of the envelope signal and of the phase signal at the output implementing the method of Kahn (Fig. 5, the phase and amplitude signals must combine in amplifier to transmit the radio frequency signal).

Regarding claim 24, Cao further discloses the use of the transmitter for the radio broadcasting or tele-broadcasting of digital signals (col. 3 lines 26-30, advanced satellite communication system).

3. **Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao and Yang, as applied to claim 20 above, and further in view of Antonio et al. (US 6,600,792) (hereafter Antonio).**

Regarding claim 16, Both Cao and Yang do not explicitly disclose the correction loop as, wherein the parameters to be corrected (Pc) comprise a delay and correctors comprise an inverse delay.

In the same field of endeavor, Antonio teaches predistortion technique for high power amplifier (abstract). Also, Antonio teaches that the predistortion algorithms minimize the out-of-band emission of the output of the HPA by applying inverse AM-AM and AM-PM distortion at digital baseband (col. 7 lines 21-23). Also, if the applied pre-distortion function is exactly inverse non linearity, the nonlinearity cancels and the system is linear (col. 7 lines 23-27).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention to use such inverse function to the parameter, in case the correction parameter is delay between amplitude and phase, as taught by Antonio, into the system of both Cao and Yang, as a whole, the motivation is to adaptive pre-distortion technique that minimize out-of –band emissions (col.2 lines 59-61).

4. **Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Cao and Yang, as applied to claim 20 above, and further in view of Checoury et al. (US 6,947,713) (hereafter Checoury).**

Regarding claim 21, Both Cao and Yang do not explicitly disclose that the transmitter is a linear transmitter.

In the same field of endeavor, Checoury teaches Linear transmitter with similar functions like feedback control loop to control any non-linearity induced by the modulator and by the power amplifier by comparing the input signal with feedback signal (col. 2 lines 1-20). Also, Checourty teaches adaptive pre-distortion method to update the coefficients of the signal to achieve the desired signal (col. 2 lines 23-45).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of the invention to perform non-linear correction method, as disclosed by Both Cao and Yang, into the linear transmitter, as taught by Checoury, as a whole, so as to compensate for any non-linearity in transmitter without comparing feedback signal with input signal, the motivation is to adaptive way of cancelling any non-linear effects.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patel Dhaval whose telephone number is (571) 270-1818. The examiner can normally be reached on M-F 8:30-6:00.
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. Customer Service can be reached at (571) 272-2600. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Dhaval Patel/

Acting Examiner of Art Unit 2611

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611